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Journal of the Society of Arts.

FRIDAY, AUGUST 16, 1867.

Announcements by the Council.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
Carry forward	£795	7	0
Brought forward	£795	7	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0
Messrs. Van Wart and Co., Birmingham	5	0	0
Carry forward	£952	15	0

Brought forward		£952	15	0
Messrs. Evans and Askin, Birmingham	..	2	2	0
C. Shaw, Birmingham	..	2	2	0
James Barwell, Birmingham.. ..	..	1	1	0
Messrs. Chance and Co., Birmingham	..	5	5	0
Total		£963	5	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen. A certain number have already been selected, and some of them are now in Paris.

Proceedings of the Society.

Society's Visit to Paris.

The Society's visit to Paris terminates this day. Nearly two hundred cards of membership were issued, and a considerable number of the members availed themselves of the facilities afforded them for visiting the various manufacturing establishments and other objects of interest in the French capital.

Food Committee.

The following observations are quoted from the special correspondent of the *Chemical News*, in reference to the display of Chemical and Pharmaceutical Products shown in the Class 44, Paris Exhibition :—

Numbered 7 in the English catalogue (8 in the *Catalogue Général*), we find "Borwick, George, 34, Chiswell-street, London. Baking powder, chemicals, spices, &c. ;" and we are also referred to p. 132 of the appendix for further details. What can induce anyone to exhibit baking powder we are really at a loss to imagine. It certainly is not a subject of any scientific interest; it is not a novelty; it is not interesting in appearance; its mere physical character offers no guarantee of its purity, and, in fact, its negative qualities preponderate so largely, that positively we are astonished that its exhibitor did not (like a great firm of blacking manufacturers) obtain a medal. And yet this baking powder, so insignificant in appearance, so uninteresting in a scientific point of view, so unfit, therefore, for exhibition, is, measured by a commercial standard, of far more importance than many objects that rivet our attention by their beauty or scientific interest. We have been credibly informed that a fortune has been made by its sale.

Then what is this baking powder out of which fortunes have been or are to be made? Of the composition of the powder of Borwick we know nothing, but Cooley's powder is as follows:—Tartaric acid, ½ lb. ; bicarbonate of soda and potato farina, or British arrow-root, of each ¾ lb. (each in powder); separately dry them *perfectly* by a very gentle heat, then mix them in a dry room, press the mixture through a sieve, and at once put into packets, observing to press it hard, and to cover it with the foil or close-made paper, to preserve it as much as possible from the air and moisture. Delfort's formula principally differs in the addition of *alum* (*!*) and carbonate of ammonium. With the addition of a little turmeric the compound becomes the "Egg-powder" so often seen in the windows of grocers and oil-men. These mixtures are used in domestic economy as substitutes for yeast in bread and butter in pastry, and are in their way, and in their proper places, useful, although humble adjuncts to the *materia* (may we not say *medica*) of the non-professional cook. There is no doubt that by enabling pastry to be made equally light, and with one-third less butter, the better class of baking powders have prevented many a bilious and dyspeptic attack.

Mr. Borwick, in addition to his baking powders, exhibits what he terms "ozonized cod-liver oil." We are sorry to find cod-liver oil "repeating" itself in our notices of the chemical and pharmaceutical products in the French Exhibition, but we will not allow the unsavoury nature of the subject to turn us from our duty. We consider "ozonized cod-liver oil" to be the greatest of the many delusions connected with this useful food—for food it is purely and simply, and the sooner medical men understand its true character the better for their patients.

Mr. Borwick's prospects states that the impregnation of cod-liver oil with ozone is for the purpose of "conveying artificially to the lungs of the delicate and consumptive, without the effort of inhalation, and in larger proportions than found in the atmosphere, this extraordinary life-giving agent." The prospectus concludes with the following somewhat rash paragraph :—"In fact, it is now proved beyond doubt, that ozone is to the weak, delicate, and consumptive, what quinine is to those who are affected with fever—*the nearest approach to a specific yet discovered.*" The italics are those of Mr. Borwick.

Now, it appears to us that this prospectus has certain points of resemblance to the three incompatible pleas anent the cracked pot, viz:—"1st. That it was cracked when we borrowed it. 2nd. That it was whole when we returned it. 3rd. That we never had it at all." For, in the first place, a distinguished chemist who purchased some and examined it, came to the conclusions — 1st, that it did not convey ozone to the lungs of the delicate and consumptive; 2nd, that if it did, it was not to the weak, delicate, and consumptive, what quinine is to those who are affected with fever; and, 3rdly, that it did not contain ozone at all. It is really inconceivable how any one with even a smattering of chemical knowledge could imagine, even if the oil did contain ozone, that it would carry it to the lungs. The trifling fact that the oil has to be digested before it can enter the blood seems to escape the believers in this so-called remedy. That certain oils acquire powerfully oxidizing properties on exposure to light and air we admit, but it must be remembered that in all cases yet known the active oxygen attacks the oil itself as soon as the temperature is raised, and may even attack other oxidizable substances present at the same time. The most remarkable instance of the oxidization of essential oil, is, undoubtedly, that of isoprene; but when ozonized isoprene is distilled (although it boils at about 40°C.) the ozone present attacks the isoprene with violence, and converts it into an oxidized substance. We think, moreover, with the observer of that reaction, that it is doubtful if the oxygen in what we have hitherto termed ozonized oils is really in the state of ozone. The phenomena attending the passage of ozone through tubes of caoutchouc seem to indicate the impossibility of ozone existing (as such) in the presence of oxidizable organic matters.

Even if we admit that consumptive patients are better in an atmosphere which indicates the presence of ozone (or what is assumed to be ozone), what does that really prove? It seems to us rather to show that consumptive people are better when the air is free from the impurities incompatible with the presence of ozone, than that the ozone is beneficial to them. The reaction indicated by ozone test papers is not the measure of the total quantity originally in the air, but of the residue left after the destruction of the impurities. But enough of this; we trust that the time is fast approaching when medical men will know more, and talk less, about oxygen and ozone. If one did not hear it so often, it would seem impossible, that in these days of education, doctors are still found who tell their patients to go to the sea-side, "where there is more oxygen than in the close and confined streets of towns."

Proceedings of Institutions.

◆

Lancaster Mechanics' Institute.—The forty-first annual report says that although the number of subscribers is slightly less than last year, there seems to be a lively interest in the business of the Institute manifested by those who are identified with it. The number of members on the books is 468, against 493 of last year. The whole interior of the building has been thoroughly cleaned and repaired. There are now 5,643 volumes in the library; the number of volumes issued during the year is 4,265. The classes, which are for French, chemistry, geology, and English, have, with the exception of that for geology, been continued to the end of the session, and although the number of those who attended was but small, yet the importance of instituting such classes will be seen in the success which has attended their continuance during the present year. In addition to these classes, a class for the study of pure mathematics was conducted by the Rev. J. C. Lunn. The number of pupils was 26, the average attendance being 18½. The class continued for thirteen weeks, and, for the time, the pupils made satisfactory progress. The classes which have been commenced this session are a complete success. They are:—Females' writing and arithmetic class (26); females' writing and reading class (26); boys' writing and arithmetic class (28); chemistry class (33); mathematics (22); ladies' French class (9); gentlemen's French class (10); singing class (14); young men's writing and arithmetic class (7); and English language class (55). The museum has been provided with additional accommodation for the fossils and minerals, and considerable time has been spent by Mr. W. Prosser, F.G.S., who at the request of the committee undertook the task of carefully arranging the whole of the collection, so that the new classification should be in accordance with the present aspect of science. The librarian, Mr. Joseph Bell, who for a period of sixteen years has studiously watched the progress of the Institute, having resigned, the committee having, in reply to public advertisement, received 120 written applications, appointed Mr. J. W. Shaw, of Halifax, to the office. The report of the penny bank shows that the receipts for the year ending 27th October, 1866, were £633 0s. 7d., and the total receipts since April, 1860, were £7,280 0s. 1d., the average number of weekly depositors being 239. The accounts show that the expenditure was £297 19s. 10½d., and that there is a balance due to the treasurer of £129 19s. 10d. The committee of the Lancaster School of Art, in making their tenth annual report, record the continued success of the school. The number of sudents who have paid fees for instruction during the year is 841, of whom 85 were artizans. At the annual examination of the Department twenty of the students were successful. The most advanced works executed in the school were also sent to London in competition for prizes, and seven were successful; one work, by W. J. Ralph, has been rewarded by a bronze medallion in the national competition.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 601.)

BOTANY.

THREE HOURS ALLOWED.

The candidate is expected to answer correctly three questions in Section I. and six questions in Sections II. and III., including descriptions of at least two of the fresh specimens. Nos. 8, 9, *and* 10 *each stand for an answer.*

Section I.—Structure and Physiology.

1. Define the following terms, and comment upon each, as required:—

Didynamous. Give examples from two Natural Orders.
Gonidia. Where do they occur? What is their function?
Gynandrous. Give examples.
Gynophore. Give example.

2. What are *vessels?* From what Organs and Families of plants are they usually absent?

3. Explain the structure and function of *stamens.*

4. What distinctive features characterise the principal types of *stem-structure?*

5. Describe briefly the process of *reproduction* in flowering plants.

6. Explain the usual conditions to be observed in *hybridising* plants, and the results of this process, both physiological and practical.

Section II.—Systematic and Economic Botany.

1. What is meant by *genus, species, variety?*

2. What genera (giving their Natural Orders) furnish *oil* and *sugar* for economic purposes? Name the part of the plant in each case.

3. Distinguish *Labiatæ* from (1) *Scrophulariaceæ,* (2) *Boraginaceæ,* (3) *Verbenaceæ.*

4. Describe the principal modifications of the *Fruit* in British genera of *Rosaceæ.*

5. Name the Natural Orders and genera to which the British trees with *winged fruits* belong.

6. Upon what ground is importance attributed to the *stamens* for purposes of classification? What characters, afforded by those organs, are made use of in distributing *Dicotyledons* into primary groups?

7. Name the *Natural Order* to which the plants marked A, B, and C respectively belong, with *reasons* for your opinion.

Section III.—Descriptive Botany.

8, 9, and 10. Describe the three plants marked A, B, and C, in the proper sequence of their organs, and in accordance with the examples given in Lindley's "Descriptive Botany" and Oliver's "Lessons" (Appendix).

FLORICULTURE.

THREE HOURS ALLOWED.

1. Is it possible to increase the hardiness of any race of plants, and what are the most likely means by which this may be effected?

2. Name the most useful flowers for the decoration of the conservatory, to be had in bloom during September, October, and November; and indicate how each is to be prepared for blooming at that season.

3. Explain the general features of dissimilarity in the cultivation of Ferns and Succulents, and of Heaths and Orchids.

4. Tabulate the ingredients, in their respective proportions, which should be used in making up a compost for potting the following plants:—Calceolarias, Fuchsias, Camellias, Stocks, Asters, Bletias, Cattleyas, Allamandas, Roses, Dahlias, Crysanthemums, and Rhododendrons.

5. Write down the rules by which you would be guided in proceeding to water the plants in a greenhouse in the month of January, indicating how, when, and why the operation is to be performed. State all the considera-

tions, as far as known to you, which should influence the operator.

6. By what means may the races of cultivated plants be improved, so as to render them more valuable either for use or ornament?

7. Why, when, and how would you ventilate a forcing-house in full action, in the month of March, presuming that it is to be ventilated daily?

8. How would you turn to advantage, in practical floriculture, the limit of temperature, both above and below the mean, endurable without injury by different plants?

9. Show in section (by a pen-and-ink sketch) what you consider the best form of house for the purpose of Propagating plants, also that for growing Roses and Camellias respectively, indicating as far as possible by this means the internal arrangements, and noting the dimensions.

10. Name and briefly describe a dozen of the most distinct and useful plants for what is called "sub-tropical" gardening.

11. Mention as many as you can of the plants which may be propagated by leaf-cuttings, and state from what part respectively they will organise buds.

12. Give a monthly table of the temperature proper for the successful cultivation of each of the following classes of subjects:—Stove plants, Greenhouse plants, and Alpines.

FRUIT AND VEGETABLE CULTURE.

THREE HOURS ALLOWED.

FRUIT CULTURE.

1. Name eight dessert apples which ripen in succession, and state the seasons when they come into use?

2. Name eight dessert pears which ripen in succession, and state the seasons when they come into use?

3. How would you distinguish a Noblesse peach tree when in bloom from a Barrington; and how would you distinguish both from a Royal George?

4. How would you distinguish the Dutch Hamburg grape from the Frankenthal?

5. What are the causes that produce rust in grapes, and how are these to be remedied?

6. Give a list of six Peaches and four Nectarines that will ripen in succession, filling up the space between the 1st of August and the middle of October?

7. Give a list of six Plums and six Cherries that will ripen in succession from the second week in June till October?

8. What is the best season to plant fruit trees; and why is it so?

9. In what way does root-pruning induce fertility in fruit trees?

10. When trees are bark-bound, and produce a weak and languishing growth, and small ill-shapen fruit, what remedy would you adopt?

11. If one of the principal branches on a trained tree were producing shoots of too great luxuriance, while the other branches produced those of ordinary growth, how would you check the over luxuriance so as to preserve the equilibrium of the tree?

12. At what season and in what way should root pruning be performed?

VEGETABLE CULTURE.

13. Mention the varieties most worth cultivating in small gardens of the following kinds of vegetables:—Peas, Broccoli, Cabbage, Carrot, Kidney Beans, and Lettuce?

14. What variety of Lettuce would you employ to stand the winter?

15. Give a list of the Wrinkled Marrow Peas with which you would keep up a supply from the first week in June till the end of October, and state the periods when they are to be sown and when they will come into use?

16. How would you distinguish white globe onion from white Spanish?

17. Describe the difference between Champion of England pea and Veitch's perfection, and wherein do both differ from Excelsior Marrow?

18. Wherein does the Altringham carrot differ from the Long Surrey or Studley?

ANIMAL PHYSIOLOGY.

THREE HOURS ALLOWED.

Candidates may answer any four of these six questions, but only four. If any paper is found to contain answers to more than four questions, marks will be given for the first four only of those answers.

1. A piece of bread is eaten. What becomes of it? Trace the changes which its constituents undergo while passing through the animal body.

2. State the chemical and physical differences between *inspired* and *expired* air. Why does an animal die when it is made to breathe the same air over and over again? How much *pure* air ought a man of average size to be supplied with per hour, in order that he may breathe without discomfort?

3. What is meant when animals are spoken of as "cold-blooded" or "warm-blooded?" What is the ordinary temperature of the human body? How is it brought about, and how regulated?

4. In what way does the act of walking differ from running? Explain fully the mechanism in each case.

5. Give a physiological explanation of coughing. Mention other animal actions which seem to you to be of a similar nature.

6. Why does a man frown when he is suddenly exposed to a bright light? By what means is the eye able to adapt itself to a varying intensity of light?

(To be continued.)

TECHNICAL EDUCATION.

(*Continued from page* 604.)

10. *From Robert Mallet, Esq., F.R.S.*

Offices, 7, Westminster-chambers,
Victoria-street, London, S.W., June 17, 1867.

MY LORD,—In reply to the question put to me by circular of the 31st ultimo (signed by Mr. H. J. Roby), in reference to the letter of Dr. Lyon Playfair of the 15th ultimo, addressed to your Lordship, a printed copy of which was enclosed to me, I beg to state that,—1st. I do fully agree with Dr. Playfair in opinion that a better system of technical education for all classes connected with industrial pursuits has become a pressing necessity in Great Britain; that immediate steps ought to be taken for organising and securing legislatively such a system; and that large and accurate inquiry as to the state of such education in foreign countries, and as to the want of it at home, ought to be made under such sanction as will be best calculated to rouse the public mind in England from the apathy and ignorance which prevail upon the subject.

The matter is far from new to me. A university education, with a natural love for scientific investigations, the circumstances of my life, in large part engaged as the active managing partner of large engineering works, and of late years as a civil engineer, a more than common travel and knowledge of foreign countries, in their arts and educational systems, &c., &c., have long convinced me that, unless by a vast improvement in our own educational system, general and technical, the pre-eminence of England (whose *power*, more than that of any other empire that has ever existed, is based upon her industry) must decline, and with a rapidly accelerating pace, in relation to the other great nations of the world.

For more than twelve years past I have urged this publicly, and in various ways, for which I refer you to many printed documents in various periodicals, &c., and recently to articles by me in the pages of the *Practical Mechanics' Journal* and *The Engineers' Journal*, as also to my inaugural address, as President of the Institution of Civil Engineers of Ireland, of last year, and to an address delivered by me this year before the Society of Foreman Engineers of London, and printed by that Society, &c.

2nd. I do not quite agree with Dr. Playfair in his view of the Paris Exhibition, upon which alone he appears to base his conclusion as to the need of better education, &c.

The degree of representation of the great industries of Great Britain in the Paris Exhibition is no safe test of the relative position of any one industry in Great Britain and abroad. From many circumstances, with which I need not here trouble you, England is in various industries either ill represented, or not represented at Paris at all, while some foreign nations are represented upon a scale preposterously beyond their productive status; for example, in *spinning*, England, the first country as to that in the world, appears almost "no where," while Belgium would, to the superficial eye, appear the greatest spinning country in the world.

My views, therefore, have been formed, not only long before the Paris Exhibition, but independently of it, except in so far as that it has, upon the whole, tended to confirm my previous conclusions. I have, &c.

Robert Mallet, F.R.S., M.A.,
The Right Hon. Lord Taunton. Juror, Cl. 53.

11. *(Second Letter).*

Offices, 7, Westminster-chambers,
Victoria-street, London, S.W., June 27, 1867.

My Lord,—I presume it is proposed to pursue the subject of technical education in Great Britain, as raised by Dr. Lyon Playfair's letter, by some form of inquiry. 1st. As to the institutions and methods in operation abroad in several countries for securing technical education. 2nd. As to our needs of such in England, and how these may be best supplied. Having long given attention to these matters, I hope I may not be deemed impertinent if I offer a suggestion as to the *mode* by which, as I conceive, the information desirable under the first head may best be secured.

The countries in which the systems of technical education now working are such as to demand our full acquaintance with them, are France, Prussia, Belgium, Bavaria, Switzerland, and Austria, in the first rank at least these.

In all these countries a large quantity of information exists in the form of state and other printed documents, manuals, *brochures*, and treatises on education, &c., &c. These should be collected, and a report should be obtained from each country by a technical and learned native professor, in which the system in his country should be described fully and clearly, and a *resumé* given of all the literature of the subject. The *six* reports thus obtained should go into the hands of some one competent man in England to condense and compare, and report upon, as to *facts only*. You would then have something like an exact basis as to the first head to start consideration upon.

The more usual course with us in England is to *send* out a roving commission of Englishmen to collect information. From want of familiarity with Continental tongues and habits of thought, and from many other causes, my own observation leads me to think that very little information is thus obtained; and that such commissions are little more than holiday excursions at the public expense. For this I could appeal to some printed reports.

From the other course of proceeding I am satisfied a crop of highly valuable information might be expected.

I have, &c.,
Robert Mallet, F.R.S., M.A.
The Right Hon. Lord Taunton.

12. *From Peter Graham, Esq. (of Messrs. Jackson and Graham).*

29, 33, 34, 35, 37, and 38, Oxford-street, W.
June 20, 1867.

Sir,—I have delayed replying to your circular of 31st May until I had the opportunity of obtaining information on some points confirmatory of my impressions on the subject of Dr. Lyon Playfair's letter. I agree with him that a system of technical education must tend to the improvement of the manufactures of every country in which it is in operation, and that the advances made by some other countries may to some extent be attributed to its influence. It must, however, be borne in mind that if we have not made the same relative progress as other nations in some branches of industry, we have made greater relative progress in others (the natural consequence of International Exhibitions and greater freedom of trade), and that the Exhibition at Paris does not fairly represent the progress made since 1862, or the present state of several of our most important manufactures.

I may say, briefly, that of all our great textile manufactures the only ones fully and fairly represented are Scotch tweeds and Irish linens.

I apprehend great danger to our manufacturing interests, and to the general prosperity of our country, from the action and influences of trades unions, which tend to reduce, as far as possible, the intelligent and industrious workman to the same level as the stupid and lazy.

I have, &c.,
Peter Graham.
H. J. Roby, Esq., &c., &c.

13. *From David S. Price, Esq., Ph.D.*

26, Great George-street, Westminster.
June 22, 1867.

My Lord,—I have the honour to acknowledge the receipt of a letter from the Secretary of the Schools Inquiry Commission, requesting that I would favour the committee by stating whether I agreed with the substance of a letter addressed to your Lordship by Dr. Lyon Playfair, a copy of which was enclosed.

Before proceeding to comply with this request I would wish to remark that Dr. Playfair's letter refers to progress in the peaceful arts, as exemplified at the Paris Exhibition, as a whole, and is general in its conclusions.

My time at Paris was almost exclusively devoted to the jury work of my class, a very large one—chemical and pharmaceutical products—and as yet I have only had an opportunity of examining those other sections of the Exhibition in which I take a special interest, the metallurgy of iron, ceramics, ordnance, &c.; it is, therefore, not possible for me to say whether I agree with the substance of Dr. Playfair's letter. I will, however, state my opinion of so much of the Exhibition as came under my notice, and then venture to give my views upon the second part of the letter, which refers to the subject of the technical education of the working man.

As far as relates to chemical products, I consider that the exhibition made by Great Britain is a "deficient representation," and will not enable foreigners to form a correct estimate of the nature and extent of chemical manufactures now carried on in this country.

In reference to the British exhibition of iron and steel, it must not be overlooked that most of our largest iron-works are unrepresented—Mr. Bessemer's, Coalbrook Dale, Weardale, Earl Granville's Shelton, Ebbw Vale, Aberdare, Plymouth, and many others too numerous to name; that Sheffield is only represented by two or three makers—a fact that was considered so remarkable at the time that space was applied for by intending exhibitors, that it was brought to the special notice of the Associate Commissioners invited to confer with His Royal Highness the Prince of Wales at the South Kensington Museum; and that which is shown in Class 44 is, as a rule, injudiciously exhibited, contrasting painfully with the taste and spirit evinced by the French in their arrangements in the same class. Great credit is also due to the French ironmasters for the skill displayed in some departments of manufacture, especially in that of girders—a branch of rolling to which our countrymen have not yet seriously devoted their attention.

Those interested in the metallurgy of iron are much impressed at the wide dissemination which the Bessemer process has attained on the Continent as evidenced in Paris. In reference to the rapid spread of this remarkable invention, it would be instructive if the history of its introduction abroad could be published. The treatment which our eminent inventor has received—more particularly in Prussia—if it were known, might occasion grave reflections in the minds of Englishmen as to how far they are justified in granting the protection of their Patent Laws to the subjects of a kingdom which shows so little regard for the inventive genius of their own. More than this I should not like to state. The finest specimens of Bessemer steel are exhibited in the Austrian department, and are from the Neuberg works.

In connexion with these splendid achievements it may be well to inform your Lordship what I have learnt from Mr. Bessemer respecting the introduction of his process into Austria. Mr. Bessemer informs me that the Government erected model works of his process, and invited the iron and steel manufacturers to inspect them, and to forward samples of their pig-iron, in order to have them tested as to their adaptability for the process. The success of the enterprise is complete, and the Austrians may congratulate themselves upon the brilliant prospect which it promises for the development of their iron industry.

There is one little thing, however, which they have omitted to do, and that is to reward the inventor for the great benefit he has conferred upon the empire. Possibly a knowledge of the history of the iron and steel manufactures in our own country may have afforded both Austria and Prussia a plea as well as a precedent for their injustice and ingratitude to British inventiveness.

It is unnecessary for me to say anything respecting the exhibition made by England in ceramics, as a unanimous verdict of approval has been given as to the manner in which our leading manufacturers have supported the reputation they had acquired at former exhibitions. As regards the British exhibition of ordnance, there must be many opinions as to the merits of our guns, but as regards the display there can be but one, and that is, that it redounds to the credit of the officials at the arsenal.

Before leaving the subject of the Exhibition, I would wish to state my conviction that it is most important that these International competitions should not be allowed to degenerate into a means for advertising; and it behoves those who are entrusted with the organization to see that the several departments of industry are entrusted to men who take an active interest in them, and are thus a guarantee that every endeavour will be made to have them fairly and properly represented, which is not the case on the present occasion, so far at least as refers to Classes 40 and 44.

In reference to the second part of Dr. Playfair's letter, recommending that an official inquiry should be made into the means " by which the great states are attaining an intellectual pre-eminence among the industrial classes, and how they are making this to bear on the rapid progress of their national industries," I would beg to observe that the sooner we are acquainted with the facts the better.

Whilst assenting to the proposition, I must distinctly state that I do not agree with Dr. Playfair that the technical education of working men is the most important method for the maintenance of our industrial supremacy. The information gleaned by acting upon his suggestion would be instructive, and great good would result from its application, but what is really wanted for this country, and is of vital consequence to our future prosperity, is a higher scientific culture of those who are likely, in the natural course of events, to be master manufacturers, so that when discoveries are made they may fructify and not stagnate or decay, as has too often been the case, for want of intelligence on the part of those who command capital and works to perceive their merits; and that they, the manufacturers, may be able to appreciate and adequately remunerate the scientific talent that this country is, and always will be, able to afford them.

I would add further, that no reformation bearing upon industrial progress is more required than in the legislature, and it is a reproach to the country that science is not represented in Parliament.

It is only a few years since that our classic and commercial statesmen repudiated the idea of the exhaustion of coal in England, whilst last year they, in a fit of alarm, organised a commission to inquire into its probable duration.

It would be well if an investigation were made as to what have been the results of the teachings in science of the German universities; what Liebig has done for modern chemistry, and how the system inaugurated by him at the small University of Giessen has spread throughout the world, and what benefits have resulted from it; what we owe to the teachings of other chemists, the physicists, metallurgists, and geologists of those excellent seats of learning. Whilst advocating the necessity for the dissemination of scientific training in England, I must not omit to bestow a passing tribute of commendation to the success of those institutions of recent date which were established to supply a want that existed many years since. I allude to the Royal College of Chemistry, of which the late Prince Consort was the president, the School of Mines, and the colleges in the metropolis where scientific departments have been founded. Of the two former I can speak from positive knowledge. In the first named, many of the men who have taught, and not a few of those who have studied there, have not only enriched chemical science by their researches, but have left a permanent mark upon the leading industries of this country. From the School of Mines have emanated men who in metallurgy and geology have greatly extended the application of those sciences, nor is this to be wondered at, when we consider the reputation of the professors under whom they have studied. It is, however, a well-known fact that the public do not rightly appreciate the education that this institution is capable of affording, and that comparatively but few of the sons of manufacturers avail themselves of its advantages.

Before concluding I would beg to call your Lordship's particular attention to a plan proposed by the eminent chemist, Professor Frémy, of the Institute. It is one most just and wise. He proposes that young chemists of talent, who are desirous of devoting their time to the advancement of science, and therefore for the benefit of mankind (and there are always many, not only willing but anxious to do so) should be liberally supported by the State. I quote the plan from memory, and can therefore only give the outline of his project. Permit me to suggest that your Lordship should bring this excellent idea to the notice of the noble and learned Chancellor of the University of London, who from his well-known zeal in the cause of education, and from his position, is better able than anyone else to obtain the evidence of scientific men as to its value, and, if approved of, to secure its adoption in this country. The same principle might be extended to the other departments of science which bear upon industrial progress.

In conclusion I must express my firm belief that extended scientific education is of the highest consequence to us if we wish to retain our present position in the scale of nations, that it will mostly benefit the future master manufacturer, that it must tend to elevate the social position of the intelligent working man, and to create a greater sympathy between master and man than at present prevails, and if it do this, the evils which threaten to impede, if not to paralyse, our national progress may be averted. I have, &c.,

David S. Price, Ph.D.

The Right Hon. Lord Taunton, &c., &c.

(*To be continued.*)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1867.

The thirty-seventh meeting will be held at Dundee, and will commence on Wednesday, the 4th of September next, under the presidency of his Grace the Duke of Buccleuch and Queensbury, K.G.

The liberality of various public bodies has placed at the disposal of the Committee excellent and central accommodation for the sectional and other meetings; a large fund has been raised to defray the local expenses; the offers of private hospitality are numerous; special invitations have been given to a number of distinguished foreigners and corresponding members; and every effort will be made to receive and entertain visitors in the most cordial manner.

The reception-room at the Royal Exchange, Panmure-street, Dundee, will be open on Monday, September 2, at twelve o'clock, for the sale of tickets; and there every information will be given to visitors.

Members and Associates are received on the usual conditions.

The opening address will be delivered in the Kinnaird Hall on Wednesday, the 4th Sept., by the President.

Soirées will be held in the Volunteers' Hall, Parker-square, on the evenings of Thursday, the 5th, and Tuesday, the 10th of September. Evening lectures (by A. Herschel, Esq., on Shower-Meteors, and by A. Geikie, Esq., on the Geology of Scotland), will be delivered in the Kinnaird Hall, on Friday, the 6th, and on Monday, the 9th of September, at half-past eight o'clock.

Excursions have been arranged to take place on Saturday, the 7th, and Thursday, the 12th of September, to the Den of Airlie, Glamis Castle, Rossie Priory, Dura Den and Kilmaron, Newburgh and Errol Park, Balruddery, St. Andrews, Arbroath, Montrose, Falkland, and Loch Leven. Luncheon has been kindly offered to members of the association at the above places, by the following noblemen and gentlemen:—The Earl of Airlie, the Earl of Strathmore, Lord Kinnaird, Sir David Baxter, Bart., George Armistead, Esq., James Edward, Esq., the University of St. Andrews, the Provost and Corporation of Arbroath, the Provost and Magistrates of Montrose, and the Montrose Natural History and Antiquarian Society, and others. Other excursions are in course of arrangement, and special programmes of each excursion will be issued in the reception-room.

The Sections are arranged as follows:—

Section A. Mathematical and Physical Science, High School, Centre Hall.
„ B. Chemical Science, High School, Mathematical Class-room.
„ C. Geology, Panmure-street Chapel.
„ D. Biology, High School, School of Art.
„ E. Geography and Ethnology, Albert Institute.
„ F. Economic Science and Statistics, Euclid-street Chapel.
„ G. Mechanical Science, Watt Hall, Constitution-road.

The principal railway companies have consented to convey members and associates at a reduced fare for the double journey. To secure this privilege an early application must be made to the local secretaries, 21, Reform-street, Dundee, for pass-tickets.

Tourists' tickets are issued from London to Dundee, available for return within one month, Fares—1st class, 138s.; 2nd class, 102s.; 3rd class, 56s. each.

METEOROGRAPH AT THE PARIS EXHIBITION.

One of the most interesting objects in the Exhibition is the meteorograph, invented and exhibited by the Director of the Observatory at Rome, Father Secchi, and for which he has obtained the "Grand Prix." This apparatus is perfectly self-acting, and registers, in the form of a diagram, the changes of the atmosphere as they take place. On each side there is a board, covered with paper, moving vertically in a frame from top to bottom by means of clockwork. On one is registered, for two days and a-half, the indications of the barometer, psychrometer, and the hour and currents of rainfall. On the other board, which completes its course in ten days, the indications of the force of the wind, its direction, the metallic thermometer, the height of the barometer, and the hour of rainfall, are likewise repeated.

The barometer tube is of wrought iron, bored out perfectly cylindrical. The upper part, forming the barometric chamber, is 2·36 inches in diameter, and the tube is 0·69 inches in diameter. This tube floats freely on the top of the mercury, and a great part of its weight is supported by a wooden collar driven on the lower part. The top is attached to one end of a lever, with a counter-weight at the other end; another lever is fixed to near the lower end, so as to keep it always in a vertical position. At each end of the suspending axis is a parallel motion, for carrying the pencil for tracing the diagram in a straight line on the two boards.

The psychrometer, or wet and dry bulb thermometer, for the purpose of determining the quantity of moisture in the air, is registered in the following ingenious manner:—A platinum wire passes through the glass at the bottom of the bulbs, so as to put the mercury in connection with a galvanic battery. The tops of the tubes are open, to allow of two other platinum wires, fixed in a frame, being, at a given moment, plunged into them, and when lowered to the level of the mercury an electrical current is established in the apparatus for holding the pencil to register the temperature and press it against the paper.

A small carriage, carrying the pencil, on which is fixed a Morse instrument, is made to traverse in front of the paper every quarter of an hour. This movement is produced by the striking part of the clock, an eccentric being fixed on the wheel making one revolution each quarter of an hour. This eccentric moves a large triangular-shaped lever; to this level is attached one end of a steel wire, the other end of which is attached to the frame on which are fixed the platinum wires at the top of the wires. In this manner the movements of the carriage and the frame are simultaneous, only the length of traverse of the carriage is greater than that of the frame, it being connected with a point on the lever further from the fulcrum. Thus, when the carriage begins to move, the frame is lowered.

The moment the platinum wire touches the surface of the mercury in the dry bulb thermometer a current is established in the electro-magnet on the carriage, and the armature at the end of a lever is attracted towards it, whilst the other end, carrying a pencil, is pressed against the paper, and marks a point representing the height of the thermometer. The carriage travels on till the second platinum wire comes in contact with the mercury in the wet bulb thermometer; an electric current is established; an apparatus above the carriage breaks the current in the electro-magnet, and the pencil is removed from the paper. In returning, the carriage reproduces the breaking and opening circuit, only in the reverse manner, and another point is obtained, which indicates the end of the line. Thus a double row of points is obtained, arranged on two curved lines, one of which represents the height of the dry bulb, whilst the other represents the wet.

The simultaneous motion of the carriage and frame is established simply by means of a steel wire, and is sufficient for the short distance between the psychrometer and the machine; in some cases, where they are some distance apart, clockwork is used, and cams, as an interruption of circuit, are attached to the clock.

The time of rainfall is marked on the same paper by means of a lever carrying a pencil moved by electricity. The movement of the electro-magnet is produced by a small water-wheel placed under the gutter in a convenient part of the building, and which by revolving opens and closes the circuit of the battery.

The quantity of rain is measured in a reservoir placed at the bottom of the apparatus. The rain-water collected in a funnel placed on the roof passes, by means of a tube, to the reservoir, and raises a float carrying a rod with a pointer, which marks on a graduated scale. At the end of this rod is attached a small chain, which passes over a small pulley furnished with a disc of paper; the rotation of the pulley is in proportion to the quantity of rain. The pencil, fixed on a support, moves along the radius of the disc at the rate of about 0·20 inches per day, and in this manner the quantity of rain is marked each day on the wheel at a different place.

The reservoir is 7·48 inches in diameter, whilst that of the funnel is 14·96 inches, or four times the area; thus the height marked on the scale is four times that of the actual fall.

The direction of the wind is registered by four telegraphs. At the foot of the weather-cock is placed a circle with four metallic sectors, covered with platinum, against which a small projection on the axis is pressed.

The apparatus is provided with four telegraphs, the electro-magnets of which are respectively in communication with the four sectors; each of these four telegraphs, by vibrating its lever according to the direction of the weathercock, connects the circuit, and gives one of the four cardinal points. The register of intermediate winds is obtained by the combination of the two neighbouring ones. A vibration of the rod to which the pencil is fixed is produced by each revolution of the vane, for measuring the velocity of the wind.

The velocity of the wind is measured by the anemometer invented by Dr. Robinson, which consists essentially of four hemispherical cups, having their diametral planes exposed to a passing current of air; they are placed at the end of four horizontal arms, attached to a vertical shaft or axis, which is caused to rotate by the velocity of the wind. On this shaft an eccentric is fixed, by means of which a succession of currents in opposite directions is produced. The apparatus is provided with three counters, which are put in motion by the electrical current, which passes by the middle counter, whatever may be the direction of the wind, and at each revolution of the vane the escapement wheel of the counter is advanced one tooth by means of the electric current. This counter gives the number of revolutions of the vane; this is reduced into kilomètres on the second dial of the counter. The velocity of the wind each hour is noted on the diagram, fixed by means of a chain, which is wound more or less, according to the strength of the wind, on a pulley. This chain is connected with a parallel motion, to which is fixed a pencil. This pencil, drawn by the chain, traces a line more or less long, corresponding with the length of chain wound on the pulley. This pulley is thrown out of gear every hour by means of an eccentric fixed on the striking part of the clock, and by means of a counter weight the chain is unwound, and the pencil makes its mark on the paper.

The metallic thermometer consists of a copper rod, the expansion and contraction of which act on a lever, which communicates with a pencil for tracing the curve corresponding with the variations of temperature on the paper. This rod is 52ft. 6in. in length.

An apparatus on the same principle has been at work for the last seven years at the Observatory at Rome, with most satisfactory results, and an atlas of diagrams registered by it is exhibited.

The galvanic battery used is a modification of the Daniell battery, with sand.

The clock and wheel-work of the counters were made by M. Détouche, of Paris; the other parts by M. Eren-Brassart, of Rome. The wood-work is by M. Pietrocola, of Rome. The barometer tube, which is a forging requiring great care, made like a gun-barrel, was constructed in the workshop of M. Mazzocchi, gunsmith, of Rome.

Fine Arts.

International Architectural Congress at Paris.—The Imperial Central Society of Architects of France have initiated a series of conferences, the first of which took place a few days since. M. Baltard, Member of the Institute of France and President of the Central Society, opened the proceedings with a complimentary reference to the attendance of foreign architects, and invited discussion on all points raised. The first question brought before the meeting was, "What, in an æsthetic and philosophical point of view, is the actual condition of architecture amongst modern nations, and what are its tendencies?" M. A. Hermant opened the question, arguing that the tendencies of the age were eminently scientific and industrial, and that such tendencies had produced an almost universal eclecticism, which had become the dominant characteristic of the architecture of the 19th century; and that industry inevitably tended to raise the useful above the beautiful, which was an unfavourable condition for the manifestation of art. At a second meeting, held some days later, the question was discussed, the conference generally adopting M. Hermant's view. The second question, opened by the president, M. Baltard, was, "What are the methods of education at present in use?" M. Baltard showed that in old times young architects were trained by masters with whom they were in close and intimate relation, and that afterwards such training was completed by special courses of study and competitions in public schools. The president strongly advocated the development of artistic study. M. Boeckmann, of Berlin, explained in outline the system adopted in his country, and mentioned the special fact that no distinction was made there between architecture and civil engineering. The third subject of discussion was, "The position of the architect in society, taken from a professional point of view;" and the fourth, "The influence of architecture on the productions of industry." The conferences were altogether four in number, and there was a generally-expressed hope that the architects of various nations should come into more frequent communication. Several Prussians, a Russian, and a Portuguese architect present took part in the proceedings, but no English name appears.

Encouragement to Art in France.—Madame Troyon, mother of the late admirable artist, has offered the Academy of the Beaux Arts of Paris to establish an annual prize of 600 francs, or a biennial one of twice the amount, to be called the "Prix Constant Troyon," for the assistance and encouragement of French artists whose age shall not exceed thirty years. The academy has accepted Madame Troyon's offer.

Commerce.

The State of Egypt.—The following is extracted from the report of Mr. Consul Stanley, on the trade and commerce of the port of Alexandria for the year 1866:—"The development of the railways, and the introduction of steam power for irrigation and cotton gins and presses, have added largely to the coal required for the country; and the wealth of the people, consequent on the profits derived from the cultivation of cotton, has largely contributed to the general use of British manufactured goods amongst the rural population. These two items are almost wholly carried in British ships; and, in 1862, when cotton was first planted, to the almost total exclusion of cereals, the increase in the number of British vessels over the preceding year was extraordinary. This increase has been since fully maintained. The year opened with good prospects for cotton, the price here for 'Fair' being 23½d. on the 1st of January, and the quantity shipped in the first three months reaching 71,500 bales, of which upwards of 33,000 left in the month of March. News then arrived of large shipments from America. This, combined especially with the monetary panic in England, greatly reduced its value, which, in November, fell to 15d., a difference of 9d. from the highest rate of the year, namely, 24d. at the end of March. The new crop first appearing for shipment in October will show a large diminution, both in quantity and quality, compared to what was at first anticipated. The value of the shipments in 1866 was less than half the value of the shipments in 1865, namely, quantity sent to England, 946,000 cantars, valued at £5,825,000; to other countries, 207,000 cantars, valued at £1,271,500; making a total of 209,000 bales, valued at £7,096,500, in 1866; against £15,839,100 in 1865. Cotton seed naturally shows the same diminution, both as to quantity and quality, as its produce; but large rates have been obtained, in consequence of its scarcity here, and the increased demand for it in England. The present condition of the agricultural industry of Egypt has been so entirely diverted from the rotation of crops in its normal state, that any person now going through the country to take a view of the produce of the soil would be altogether misled. The enormous profits which were realised by the growth of cotton during the American war have caused this. When the Cotton Supply Association sent a memorial to the late Viceroy, Said Pasha, praying his Highness to use every possible effort to encourage the cultivation of cotton, the reply was characteristic, and evinced a correct impression, and almost a prophetic dread of the revolution that would be produced by an immoderately enhanced price for cotton. He said, 'Prices alone will prove a sufficient stimulus without any effort on my part; but God forbid that I should ever see the abandonment of the ordinary succession of crops for the production of cotton, to the exclusion of those products on which we subsist.' Within a short period from that time Egypt, which had ever been a large exporter of grain, of beans, &c., had to seek food from other countries, and became an extensive importer; grain was considerably dearer in the interior than at Alexandria; in some places absolute famine ensued. An undesirable change was wrought, the recovery from which will be as slow as its accomplishment was rapid. The value of land was quadrupled; wages rose in an equal ratio; labourers earned so easily sufficient for their wants that they became indolent; an excessive luxury sprung up, and that not of a nature to benefit the commercial world, being displayed in a demand for white slave girls, costly pipes, and other such appliances, which do not much benefit the industrious world without. Meanwhile the land, from the constant crops of cotton in succession, has become impoverished. Cotton, however, has long been, and must continue to be, the most important production of Egypt. It is sown in March or April, and arrives at maturity in August or September. An average yield in good summers is 300lb. to the acre; the New Orleans variety has been found to yield 800lb. per acre; but it is found unmarketable, and is therefore little cultivated. Cotton seed has also become an important source of profit. In 1858 the ardeb of 270lb. sold for 25 tarif piasters, now it sells from 65 to 75 piasters. Formerly it was not of sufficient value to justify its being sent to Alexandria, and it was used as fuel. Now it is all shipped to Europe, and from it is pressed an excellent oil, and from the refuse a cake is made which is said to be more nutritious than linseed cake."

The Supply of Guano.—At the recent meeting of the Highland Agricultural Society at Glasgow, Professor Anderson referred in a lecture to the complete exhaustion of guano from the most northern of the Chincha Islands, and to the inferior quality of guano now obtained from the southern island. The farmer buys for his money a smaller quantity of fertilizing matter than he formerly did; the effect, however, will scarcely be felt in the first crop, but must ultimately tell to disadvantage from the deficiency of residual fertilizing matter left in the soil. As the demand for real Peruvian guano is not increasing, there is a fair prospect of its lasting for a generation to come, but at the end of that time the supply of nitrogenous manures must become a very grave question, seeing that the ammonia contained in the Peruvian guano annually imported is equivalent to about 120,000 tons of sulphate of ammonia, greatly exceeding the quantity of that substance at present derived from all other sources put together. Hope lies in the increased manufacture of ammonia in gas works and in various processes of the arts, and also in the gradual reproduction of natural guano—of which we have an instance in the renewed supply from Ichaboe, an island exhausted about 30 years ago. The lecturer showed how analysis and the system adopted by importers have checked and almost destroyed the practice of adulteration; he then noted the improvement in quality and the diminution in price which have been latterly found in superphosphates, due in great part to the introduction of bone ash and mineral phosphates. Dissolved bones may be said to no longer exist: we now get a mixture of these with bone ash or mineral phosphate; and, by an improvement in the process of manufacture, the manure is much more finely reduced, and more convenient for application than it used to be. So far as the supply of phosphates is concerned, Professor Anderson feels no anxiety, new mines of these substances being continually discovered, and often in the most unexpected geological formations.

Colonies.

Natal Horses for India.—The following is extracted from the *Natal Mercury*:—" Horse-breeding is represented by those farmers that pursue it as being about as satisfactory and profitable an occupation as any in Natal. Of course certain conditions are requisite. Pasturage and locality must be adapted to the pursuit; but there is said to be no lack of either in the midlands and upper districts of this colony. Horses are so much more valuable than cattle or sheep, that greater care can be devoted to the charge of a small number. They can be more tenderly handled, and more completely guarded from the inclemencies of the climate. Horses have multiplied marvellously during the last few years. Fifteen years ago it was a rare phenomenon to see a Natal kafir mounted. Now, few things are more common. The streets of Maritzburg are pervaded by half-dressed savages bestriding weedy, but often sturdy little nags. On the lands lying nearer the Drakensberg most of the kafirs have horses; and some of the chiefs in Weenen and Klip River counties can turn out a regiment of mounted followers. The blue-book returns also show how fast the stock of horses in Natal has increased in numbers. So numerous are horses getting that the breeders find it difficult to get a market for them. Hence their anxiety at this time to open up India as an outlet for sale. Major Erskine and Col. Pennefather have severally initiated the movement, and the farmers have jointly taken it up. They say they are quite ready to supply horses according to the prescribed conditions, but as regards shipment and disposal, these being commercial matters, they leave business men to undertake that part of the work. A correspondent, who proposes himself to be a seller, says that the farmers can and will find the horses, and supply the food, and further, they agree to let all expenses incurred be a first charge upon the proceeds of sales. Consequently, the shippers will run no risk —unless, indeed, the horses are lost on the way. This proposal, therefore, deserves to be considered by some of our merchantmen, who are so often complaining of the want of exportable commodities. The commercial community is bound to co-operate with the producing classes in such a movement. Nor ought they to be supine. By good luck Natal has won the favour of the Indian government as regards horse supply, in the teeth of the prior claims and older reputation of the Cape Colony. In the latter, public attention is again being directed to the project, and the fact that Natal has stepped in and anticipated her elder sister, is cited to the discredit of the latter. It will be yet more to our discredit if, having won the preference, we lose it, or fail to make good use of it. Australia is as alive as the Cape now is to the advantages presented by India as a market for horses. But there is another reason why prompt action is expedient. The Persian authorities have just removed certain restrictions from the sale or exportation of horses, and the Arabian ports are open for the shipment of the fine animals for which the Indian service was formerly renowned. Our last Bombay papers make much of this fact, and it may possibly affect in some degree the readiness of the government to purchase Natal horses. Madras, however, is open to us as well as Bombay, and the success of Captain Linthorne's speculation gives fair encouragement for a repetition of the venture. To succeed in this movement, our breeders will of course have to aim at excellence in blood and quality. They know what stamp of horse is needed. They know that they can rear it. It will be for them to effect yet further improvement, and make a study of what may hitherto have been more a pastime than aught else. The rearing, training, and perfecting of so noble a creature as the horse, is an employment worthy of any man's powers, and if a fair sale be ensured for the results of labour, we may expect to find this branch of enterprise extensively followed. Since penning the above the Howick resolutions have reached us, and we are glad to find that matters are so far matured by our enterprising breeders, and that no more time will be lost.

The Grass Tree.—A correspondent of the *Melbourne Argus* speaks of having seen a sample of a square-headed broom, made from the colonial grass-tree, and produced by machinery, which will turn out the article in any quantity that may be desired. It appears to be admirably adapted (says the writer) for the general purposes of a household broom, and has been already brought into extensive use in some localities. The broom has been used by puddlers for sweeping out their machines, and this severe test speaks well for the durability of the new industry.

Mining in South Australia.—The great question of the day is the peculiar position of the mining interest. The renowned Burra Burra mines, which have added four millions sterling to the exports of South Australia, are closed, and the whole of the newly-developed mining interest in Yorke's peninsula (where more than 10,000 people live exclusively dependent on the mines) is threatened with sudden extinction by the stoppage of the hitherto prolific Moouta mines, consequent on an injunction granted by the Supreme Court, prohibiting a distribution of profits, causing the withdrawal of all accommodation by the bankers of the mine.

Gold in New South Wales.—The diggers everywhere are doing well, and the yield of gold during the month is in excess of that of last month. At Emu Creek a gold reef has been struck at some distance from the old workings, and gold obtained in more remunerative quantities than ever. There is but one crushing machine on the ground, and that is of very inferior construction.

Sugar in Queensland.—A letter from Mr. Walter Hill, curator of the Botanical Gardens at Brisbane, which has appeared in a colonial paper, says:—"The several experiments made in the cultivation of the sugar cane in Queensland during the last two or three years have sufficiently proved the practicability of the enterprise, and fully justified the hope that, ere long, the youngest of the Australian group will creditably compete with England's most favoured East and West Indian possessions in the cultivation and export of sugar. The question as to the capability of the colony to grow the sugar cane having been decided in the affirmative, the next—if not the only important—question to be inquired into is the nature of the soil best adapted to the growth of the sugar cane in Queensland, and the varieties of the cane which are likely to admit of the most profitable cultivation. It is true the experiments already made are comparatively very few in number, and it may even be doubted whether the varieties inherently best adapted to the peculiarities of the Queensland climate have been tried at all. My experience, however, so far as it goes, embraces several very highly esteemed varieties of cane, which, in the West Indies and elsewhere, are regarded as the chief staples of the sugar-trade, and in nearly every instance the experiment has been eminently successful. The first, and hitherto perhaps the most important sugar plantation established in Queensland climates, is that of the Hon. Louis Hope, at Cleveland. If I remember rightly, it has been in existence about three years, and during that period it has produced some fine crops of various descriptions of sugar-cane, including the varieties known as the Bourbon, Otaheitean, the Ribbon, and Batavian, which are looked upon in all other parts of the globe as by far the most prolific and valuable in their secretion of saccharine matter. The soil in this plantation is slightly elevated, and of a dark-reddish chocolate colour, with a little admixture of volcanic *débris*, and characterised more by dryness than moisture. When properly prepared, this soil is adapted to all kinds of sugar cultivation, but most particularly to the growth of those canes known as short-jointed and swollen stemmed; which in comparison with the elongated jointed, generally contain a much greater density of juice, or larger proportion of saccharine matter. Among those which seem to flourish best are the purple violet, or large black cane of Java, and the Diard rose cane, both short-jointed. Of the elongated, as next in rank, may be mentioned the white or yellow cane of the Mauritius, or Bourbon cane, and the Guingham or ribbon cane of Batavia. The next plantation in the order of time is Messrs. Raff and Co.'s, at the Caboolture river, comprising about 130 acres under cultivation. The soil here is a very moist black alluvial, of considerable depth and richness, and the elongated canes, in consequence, attain a most exuberant growth. Many of them reach a height of from fifteen to twenty feet in eleven months, and, although this may be taken as a general indication of success in the cultivation, it is by no means a favourable criterion of the density of the juice or richness of the saccharine secretion. The more excessive the woody growth in height, the thinner generally is the juice. These, as well as the short-jointed canes, however, possess one very important advantage, in the fact that their stoles (the stumps or roots whence the plant cane, or original, was cut) throw up suckers or ratoons in larger numbers; and, singular to say, the experiments at Cleveland prove that the ratoons in the short space of nine months attained a greater density of juice than the original canes did in sixteen or eighteen months, thus showing that the young ones are the medium of sudden and progressive improvements. It may be mentioned that all the varieties of canes planted at the Caboolture, although not nearly so numerous as those grown in some other parts, have thriven exceedingly well. Several other plantations have also been started within the last eighteen months, among which may be mentioned one at Pimpama, one at the Albert, one at the Caboolture, several at Maryborough, two at the Pioneer, one at Port Denison, and one at Rockingham Bay, in all of which cases the progress of cultivation is extremely encouraging, and suggestive of the most brilliant hopes for the future. From the facts already developed by experience, one thing seems very certain, namely, that the whole belt of land along the sea-coast from one end of the colony to the other is pre-eminently suited for sugar cultivation."

Queensland Cotton.—The quantity of cotton raised in

Queensland during the past three seasons is as follows:—In 1864, 28,730lbs.; in 1865, 145,820lbs.; first ten months of 1866, 183,630lbs. A much larger area of ground is under cultivation for the season of 1867. Forty bales of cotton, the first picking of this season, has already been sent to Brisbane from the Townsville cotton plantation, one of the largest in the colony, situated about forty miles from Brisbane. It is estimated that the yield from this plantation alone will be about 670 bales.

The Intercolonial Exhibition at Melbourne.—Much interest has been taken in this Exhibition. The number of season ticket-holders was 4,244, who visited the Exhibition 92,331 times. The amount received for the tickets was £3,004 15s. The number of gratuitous passes issued was 15,038 to exhibitors. The number of payers at the door was 124,175, paying £6,829 15s., making, with the season-tickets, £9,834 10s. The number of visits paid amounted in all to 252,404, out of a population of about 650,000.

Provisions in Victoria.—Grain and every kind of agricultural produce are very abundant, and prices are consequently low. Wheat averages about 40s. per quarter, and at that price shippers are still buying for England. In some parts of the colony wheat is worth no more than 24s. per quarter, owing to the distance from market. Bread is now cheap everywhere. A company of stockowners has been formed at Riverina, for the purpose of erecting an establishment at Hay, capable of boiling down 10,000 sheep weekly. Formerly there was more fat beef in the colony than could be consumed, but the number of cattle in Victoria has been decreasing for some years past, sheep having been found more profitable, so that Victoria is now partly dependent on the neighbouring colonies for the supply of beef; therefore no cattle will be boiled down, nor will the colony be able to enter largely into any project for preserving and exporting meat.

Notes.

The Proposed Co-operative Congress in Paris.—The authorities have refused permission for the meeting of the International Co-operative Congress proposed to be held in Paris this year, at the suggestion of the Société du Crédit au Travail.

Aeronautical Experiments.—So many extraordinary attempts have been made to control balloons, and generally with such lamentable results, that anything new in the way of aeronautical experiments mostly calls forth a smile. Still, when a man of acknowledged ability takes up the subject seriously his efforts deserve attention, and such seems to be the case with M. Henry Giffard, the inventor of the famous steam injector. It appears that in 1852 this gentleman made an ascent within the Hippodrome, seated on the tender of a small steam-engine, suspended to a cylindrical balloon. Preparations are now being made by the same gentleman for raising a balloon of sufficient size to carry a number of persons, principally with the view to scientific experiments. M. Giffard proposes to make his balloon captive during these experiments, and for this purpose he has provided a cable 300 mètres long, and weighing a ton. The plan adopted by M. Giffard is not made known, but the importance of the experiment may be indicated by the fact that two steam-engines, of about 20-horse power each, form a part of the material prepared. The experiments are to take place within a large circular enclosure, which may be seen from the gate of the Exhibition in the Avenue Suffren.

The Public Gardens of Paris.—There are in Paris, besides the parks, twelve gardens thrown open to the public; and the following are the particulars of their size and the cost of their formation:—The Garden (or *Square*, to adopt the Paris name) of the Tower of Saint Jacques measures 5,785 square mètres, and cost 141,700f. The Square des Innocents, which contains the fountain decorated with the nymphs of Jean Goujon, measures 1,957 mètres, and cost 201,580f., which includes, evidently, the restoration of the fountain. The Square of the Temple measures 7,524 mètres, and the cost was 148,580f. The Square Vintrinille, the first formed in Paris, was purchased by the authorities several years since, and was transformed at a cost of 13,500f.; this square is only 778 mètres in extent. The Square Sainte Clotilde, in front of the church of that name, measures 1,733 mètres, and its construction cost 32,229f. The Square Louvois, in the Rue Richelieu, covers 1,776 mètres, and the expense of its transformation was 56,000f. The square recently formed about the expiatory chapel of Louis XVI. and Marie Antoinette is 6,165 mètres in extent, and cost 183,000f. The Square of Belleville measures 12,100 mètres, and the expense of its transformation was 20,000f. The Square Montholon measures 4,300 mètres, and cost 185,000f. That of Montrouge, 7,100 mètres, cost 101,500f. That of the Arts-et-Métiers, in the Rue Saint Martin, 4,112 mètres, cost 320,000f. The largest of the new squares, or gardens, is that of Batignolles; it measures 15,000 mètres, and the laying out cost 155,000f. The whole of these gardens form, together, open spaces in the centre of the city measuring about seventeen acres, and the whole expense of their establishment, or conversion, amounts to about £63,000.

Abolition of Imprisonment for Debt in France.—The French legislature has totally abolished imprisonment for debt; and the other day the doors of the debtors' prison at Clichy, in Paris, were thrown open, and the same was of course done in the provinces. The number of persons confined at Clichy amounted to little more than sixty.

The Director of the Paris Mint.—M. Dumas, chemist and senator, has been appointed to succeed the late M. Pelouze, as director of the *Commission des Monnaies* of Paris. M. Dumas had previously resigned his appointment of professor in the faculty of science in the University of Paris, and inspector-general of the high schools of France.

Safety for Railway Travellers.—It is said, on the authority of a French journal, that it has been determined to enforce the establishment of a foot-board, provided with a hand-rail, along the whole length of every train, in order that conductors, as well as passengers, may have the means of escaping from the attacks of malefactors or danger from fire; such a plan has been partly carried out on the northern and southern railways of France.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 1st August, 1867.

Par. Numb.
292. Bill—Railways (Scotland) (Lords' Amendments).
405. (I.) Mail Services (India and Australia)—Correspondence.
454. Navy (Dockyard Stock Valuation and Expenditure on Ships, &c.—Return.
455. Navy (Dockyards and Steam Factories)—Return.
471. Fire Protection—Report from the Select Committee.
481. East India (Bengal and Orissa Famine)—Despatch.

Delivered on 2nd August, 1867.

404. Statute Law Commission—Accounts (corrected copy).
433. Paris Exhibition—Report and Evidence.
442. Coinage—Account.
462. Educational Service (Bombay)—Correspondence.
British Columbia and Vancouver Island—Further Papers.
Jamaica—Further Papers.
Public General Acts—Caps. 36 to 57.

Delivered on 3rd August, 1867.

294. Bill—Quinagh and Parsonstown Drainage.
295. „ Local Government Supplemental (No. 5) (Lords' Amendments).
475. Distillers, &c.—Return.
480. Navy (Iron Ballast)—Letter.
482. Army (System of Retirement)—Report from the Select Committee.
483. Court of Session, &c. (Scotland)—Return.

488. Parliamentary Boroughs—Return.
493. Tenements (Roscommon)—Returns.
Jews (Moldavia)—Further Correspondence.
Public General Act—Cap. 58.

Delivered on 5th August, 1867.

296. Bill—Recovery of certain Debts (Scotland) (amended).
297. ,, Trusts (Scotland) (amended).
298. ,, Railways (Ireland).
473. (I.) National Education (Ireland) (Denominational System)—Answers.
467. Poor Rates (Scotland) and Parliamentary Burghs (Scotland)—Returns.
484. Valuation (Ireland)—Returns.
489. Refreshment Houses—Return.
494. Merton College (Correspondence).
501. Poor Law Unions (Valuation Lists)—Returns.
Public Petitions—Thirty-sixth Report.

Delivered on 6th August, 1867.

491. Wexford Harbour—Returns.
495. Metropolis Subways Bill—Minutes of Evidence, &c.
502. Army Prize Money—Account.
503. Ecclesiastical Titles and Roman Catholic Relief Acts—Report from the Select Committee.
Abyssinian Captives—Further Correspondence.
Public General Acts—Cap. 59 to 69.

SESSION 1866.

422. (B I.) Poor Rates and Pauperism—Return (B).

Delivered on 7th August, 1867.

286. Bill—Clerk to Justices in Counties.
299. ,, Merchant Shipping (amended).
300. ,, Naval Knights of Windsor.
301. ,, Representation of the People (Lords' Amendments).
302. ,, Railway Companies' (Ireland) Advances.
431. (A 1) Poor Rates and Pauperism—Return (A), May 1866 and 1867.
456. County Treasurers, &c. (Ireland)—Abstract of Return.
499. Chamber of London—Annual Accounts.

Delivered on 8th August, 1867.

293. Bill—Metropolitan Buildings and Management.
304. ,, Companies Act (1862) Amendment (amended).
305. ,, Railway Companies (Lords' Amendments).
306. ,, Railway Companies (Scotland).
313. (I.) East India (Police Force)—General Statement.
496. Mines—Report from the Select Committee.
504. Professor Thompson's Letters—Correspondence.
511. Parliamentary Deposits—Second Report from the Select Committee.
Poor Law—Nineteenth Annual Report.

Delivered on 9th August, 1867.

307. Bill—Increase of the Episcopate (amended).

Delivered on 10th August, 1867.

430. New Forest—Returns.

Delivered on 12th August, 1867.

309. Bill—Courts of Law Officers (Ireland) (Lords' Amendments).
310. ,, Agricultural Gangs.
311. ,, Courts of Referees.
105. (I.) East India (Irrigation)—Despatches.
479. Naval Prize Money, &c.—Account.
503. Ecclesiastical Titles and Roman Catholic Relief Acts—Report and Evidence.
512. Battersea Park—Return.
513. Police (St. Marylebone)—Return.

Patents.

From Commissioners of Patents' Journal, August 9th.

GRANTS OF PROVISIONAL PROTECTION.

Aërial locomotion—2149—R. Lakin.
Agricultural implements—2176—T. Reid.
Agricultural implements—2181—A. Jack.
Air engines—924—P. Shaw.
Bed bottoms, spring—2145—S. Bonsall.
Brewing apparatus—2137—W. E. Newton.
Brick-making machines—1922—W. Steven and A. Robertson.
Bricks, tiles, &c.—2158—C. H. Murray.
Cartridge cases—2167—C. E. Brooman.
Cartridges—2172—G. B. Northcote.
Cast steel, &c.—2166—C. E. Brooman.
Chairs, reclining—2171—R. Reid and E. H. Craigie.
Clasps for pocket-books, purses, &c.—2197—A. Holloway.
Clothes' lines, apparatus for supporting—2187—A. Macfie.
Coke, manufacturing—2152—H. Aitken.
Cooking apparatus—2110—G. T. Bousfield.
Cranes—2193—P. G. B. Westmacott.
Door, &c., fastenings—2116—J. Rogers.
Entrenching tools—2120—K. H. Cornish.
Fire, apparatus for saving life and property from—2083—H. G. Dunn.
Fire-arms, breech-loading—2091—T. W. Riddell-Webster.
Fire-arms, breech-loading—2153—R. B. Roden.
Fire-arms, breech-loading, and cartridges—2168—G. L. Barens and J. F. Ladougne.
Flax, treating—2104—N. J. O. Stubber.
Gas, manufacturing—2180—P. A. Rohart.
Gas regulators—2173—E. Smith.
Horticultural buildings, &c.—2150—W. Simpson and W. Howitt.
Ingots, casting—2161—A. Wilson.
Iron, manufacture and treatment of certain kinds of—2185—J. Wood.
Iron, manufacturing—2189—T. Greener and W. Ellis.
Iron, preserving—2142—H. A. Dufrené.
Lace, &c., transferring devices in—2136—H. S. Sakünlünski.
Lamps—2186—E. Ravenscroft.
Letter boxes, &c.—2141—W. Dennis.
Lightning conductors—1127—T. W. Gray.
Locks and latches—2184—T. Jones.
Looms—2138—D. Welsh.
Milling tools and circular cutters—1956—P. F. Tranchat.
Mineral oils, distilling, &c.—2175—E. A. Rippingille.
Nets and netting—2140—J. H. Johnson.
Peas, crushing, &c.—2127—A. Sezille.
Photographic negatives, &c., preparing canvas for enlarging and printing—1994—J. M. Loere.
Pipes and tubes—2159—C. T. Moulan.
Ploughs—2088—T. Pirie.
Ploughs—2160—W. E. Newton.
Rags, treating fibres from—2163—W. Wood.
Railway points and signals—2143—W. Easterbrook.
Railway trains, communication between passengers, guards, and drivers of—2156—S. Turton and G. Holcroft.
Railways—1170—J. B. Mannix.
Reaping and mowing machines—2162—J. Brown and W. Lillie.
Reciprocating motion—2155—A. M. Clark.
Rice, &c., hulling—2191—W. R. Lake.
Rollers, elastic—2174—J. Smith and W. Schofield.
Salts, &c., treating certain—1556—I. Baggs and F. Braby.
Ships' compasses—2183—G. Franklin.
Ships' signals—2165—T. M. Almond.
Steam engines—2169—J. Edge.
Steam vessels, constructing and propelling—2178—E. T. Hughes.
Studs, buttons, &c.—2195—J. H. Wyatt.
Tanning machinery—2146—S. Bonsall.
Telegraphs—2147—Sir W. Thomson.
Telegraphs—2192—G. Davies.
Tenons, machinery for cutting—2148—W. Geeves.
Type, composing and distributing—2164—A. Mackie.
Vehicles, wheeled—1976—W. R. Gorst.
Ventilators—2125—W. Taylor.
Vessels for the reception of waste matters—1710—H. A. Bonneville.
Water and gas meters—2179—W. E. Newton.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Boilers—2235—B. Harlow.
Feathers—2247—C. Touaillon.
Fire-arms, breech-loading—2227—W. R. Lake.
Pocket knives—2226—W. R. Lake.
Weavers' harness, manufacturing—2214—W. R. Lake.

PATENTS SEALED.

387. E. Manico.
389. E. H. Bernier.
390. J. B. Booth.
397. H. H. Grierson and J. McElroy.
402. W. E. Gedge.
406. W. Jones.
408. S. Osborne.
411. J. Walton and R. Harlow.
414. J. V. Toepken.
419. R. George.
435. J. Parkes.
441. A. Dillon.
455. M. Cavanagh.
539. H. A. Bonneville.
675. J. G. Tongue.
750. W. E. Newton.
882. W. E. Newton.
1256. W. Snell.
1566. W. Snell.
1590. J. R. Cooper.
1686. H. Parker.
1764. W. R. Lake.

From Commissioners of Patents' Journal, August 13th.

PATENTS SEALED.

416. D. Tenniswood.
420. J. P. Kerr and W. McGee.
427. T. W. Nicholson.
432. J. Carter.
436. E. Stevens.
437. E. Stevens.
438. R. Hodson.
439. W. Hill and H. C. Wilberforce.
442. W. H. Harfield.
444. C. Wenner.
452. H. Y. D. Scott.
473. J. M. Kaufmann.
479. W. Hale.
482. J. R. Crompton.
492. W. Clark.
497. J. P. Smith.
525. G. Young.
610. F. H. Jones.
673. W. S. Lowe.
776. F. H. Wenham.
1221. J. Cariss.
1440. A. V. Newton.
1864. W. R. Lake.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1959. R. Edmondson.
1963. N. McHaffie.
2337. H. Vale.
1998. A. B. Childs.
2006. W. Brenton.
2025. A. C. Pilliner & J. C. Hill.
2010. G. Davies.
2046. G. Coles, J. A. Jaques, and J. A. Fanshawe.
1988. H. Armistead.
2003. J. Adam, J. Webb, and J. J. Monteiro.
2050. J. J. Parkes.